



High Performance Schools

LOCUST TRACE AgriScience Farm

Fayette County Public Schools



FAYETTE COUNTY PUBLIC SCHOOLS

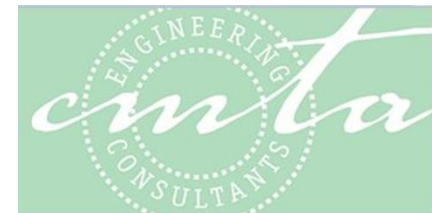


FAYETTE
TECHNICAL CENTERS



architects

TATE HILL JACOBS



PROJECT OVERVIEW

A vision with a “green” focus!

LOCUST TRACE AgriScience Farm

- **Instruction Driving Design & Construction**
 - Student Research Projects Coincide with Site Development
 - Project Serves As A Model For Sustainability





**It's
about kids.**

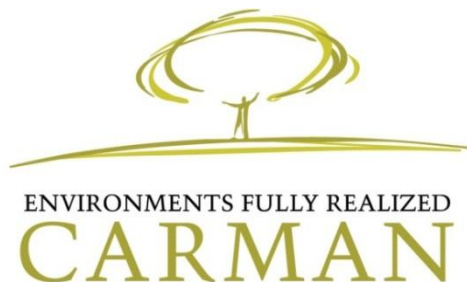
FAYETTE COUNTY PUBLIC SCHOOLS

TEAM Introductions

= Bill Wallace

architects
TATE HILL JACOBS

= Susan Hill



= Kevin Warner



= Stephanie Febles

= Isaac Fedyniak

OWNER'S VISION

Eastside AgriScience Program

- *82 acres of federal land within Fayette County but outside the Urban Services Boundary.*
- *Equine Science education programs*
- *State-of-the-art AgriScience Education Center*
- *Model for both sustainable principles and “green collar” career education*



TEAM PROCESS = Integrated Design Team

New Ideas – Careful consideration.....

- ❖ Weigh pros and cons
- ❖ Life-cycle Costs
- ❖ Maintenance requirements
- ❖ Teaching benefits
- ❖ Find the balance

All team members - at the table from the beginning...

- Owner
- End users
- Community Partners
- Architect
- Engineers – MEP
- Engineers – Civil
- Landscape Architect

Enjoy the process!
Anything new is an
opportunity for learning...



PROCESS – full collaboration



TEAM PROCESS = Inspiration & Goals

Education & Inspiration: Site and Building as Teaching Tools

National Benchmarks

USGBC has four levels of LEED:



Project Goals Manual

FAYETTE COUNTY PUBLIC SCHOOLS

Locust Trace Equine-AgriScience Campus
Leestown Road, West US 421
Lexington, KY 40511
KDE BG #09 - 339

SUSTAINABILITY GOALS & STRATEGIES

A Study for identifying the Benefits, Design Strategies and Cost Implications.

EDUCATION + ENVIRONMENT

FCPS COMMITTEE MEMBERS

Bill Wallace – FCPS Architect, Facilities Management
Kelly Breeding – FCPS,
James Hardin – FCPS Coordinator, Career & Tech Ed
Joe Norman – Principal, Eastside VoTech
Carrie Davis – Teacher, AgriScience
Kristen Arvin - FFA, student member
Daniel Patton - FFA, student member
Courtney Taggart – FFA, student member
John Price – FCPS Board Member
Kirk Tinsley – FCPS Board Member

DESIGN TEAM

Susan Hill + Mark Isbell
Tate Hill Jacobs: Architects

Kevin Warner + John Carman
CARMAN (Civil & Landscape)

Donny Crayne + David Higgins + Isaac Fedyniak
CMTA, Inc. Consulting Engineers (MEP)

Chris Kelly
Poage Engineers (Structural)

FEBRUARY 1, 2010

LEED Green Building Rating System

Sustainable Sites

Water Efficiency

Energy and Atmosphere

Materials and Resources

Environmental Quality

Innovation In Design

Regional Priority **Leadership in Energy & Environmental Design**



PETALS

Site

Water

Energy

Health

Materials

Equity

Human scale + Humane Places

Democracy + Social Justice

Rights to Nature

Beauty

Beauty + Spirit

Inspiration + Education

LIVING BUILDING CHALLENGE™ 2.0

A Visionary Path to a Restorative Future



INTERNATIONAL
LIVING BUILDING
INSTITUTE™

April 2010

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FEBRUARY 1, 2010

SUMMARY STATEMENT

When Educational and Environmental goals intersect - a rich opportunity arises for (a) providing the student the best of current 21st century education learning experiences, and (b) using the best of sustainable design practices - to create a learning lab for students, school district and the related regional community.

Imagine a building informed by its ecological region's characteristics and the site's natural resources.....that generates all of its own energy from renewable resources and uses natural resources for maximum efficiency.

This practice is an ancient human approach to living on Planet Earth – living within the bounty of the land and respecting our responsibilities to the future. We are now at an environmental crossroads, a time where we have the knowledge to integrate building practices with technology to once again live sustainably on our planet.

Green Building practices can substantially reduce or eliminate negative environmental impacts through high-performance design, waste reduction construction and sustainable operations practices. The intent is to promote healthful, durable, affordable and environmentally sound practices in building design, construction and operation. The result should be to provide our students a learning environment that is integrated into the natural environment, respecting the resources that will be needed for the students' future while sitting lightly on our planet.

We do not inherit the earth from our ancestors, we borrow it from our children – Native American

SUSTAINABILITY GOALS

1. Education + Inspiration - Site and Building as Teaching Tools
2. Using National Guidelines and Benchmarks of Sustainability Principles.
3. Regional Identity + Ecology – appropriate to place
4. Site Capacity and Use – sitting lightly on a greenfield.
5. Energy - Net Zero Energy use
6. Water - Net Zero Waste Water + Sustainable Water Discharge + Stormwater
7. Carbon Reduction - Carbon Neutral Buildings + Fuel Selection + Carbon Sequestration
8. Material Use & Indoor Environmental Quality
9. Net Zero Waste – Construction + Constructed Wetlands + Composting



High Performance Schools

LOCUST TRACE AgriScience Farm
Fayette County Public Schools

GOAL 1: Education + Inspiration - Site and Building as Teaching Tools

INTENT

For students and district and community, to promote “green collar” career education.

To integrate the sustainable features of the school facility and campus with the school’s education mission.

Learning Laboratory with metered data collected and displayed. Use data to test results of design simulations.

BENEFITS

Education –

- Design a curriculum based on the high-performance features of the building + site. This curriculum should both describe the features and explore the relationship between human ecology, natural ecology and the building / site.
- Provides students with Building Front End Learning System to visually display the building vital statistics.
- The students can monitor and calculate how much energy is being extracted from the earth from the geothermal HVAC system.
- According to Mahone Research Studies, day lighting provides a measurable enhancement to educational environments.

Economic –

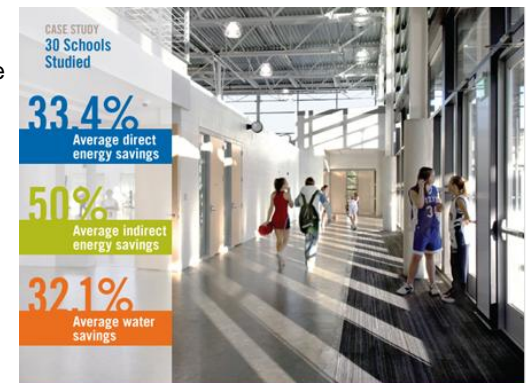
- (1) Providing the students hands-on experience and understanding of integrating human and natural systems, for application in “Green Collar” jobs.

DESIGN STRATEGIES / APPROACH

- Academic Building Front End Learning System Display
 - Provide soil moisture content and acidity levels.
 - Energy consumption on the lighting and HVAC systems.
 - Water consumption
 - On-Site Power Generation
 - Energy extracted from the earth from the geothermal system.
 - Gas produced from Bio-Digester.
 - Water Heating energy absorbed from the sun
 - Current lighting levels present in learning areas
- Provide Natural Day lighting in educational areas.
- Constructed wetlands and water gardens can be used in understanding importance of ecosystems.
- Renewable Energy systems can be used to teach materials science and energy production.

COST IMPLICATIONS

High Performance features will need to be well-maintained to accurately provide information for planned education opportunities.



GOAL 2: Using National Guidelines and Performance Benchmarks of Sustainable Principles

INTENT

To utilize the best of industry standards that challenge and support building owners, design professionals and contractors to building and operate facilities that provides for a sustainable future for our children and future generations.

BENEFITS

- Education - To tap into well-documented established approaches to integrative thinking in building design and environmental concerns.
- Economic - To determine the most appropriate application of sustainable principles, given the current materials, products and approaches currently known.

DESIGN STRATEGIES

Sustainable Guidelines and Principles

- LEED – Leadership in Energy and Environment Design
- The Living Building Challenge
- Kentucky Green & Healthy Schools

Performance Benchmarks

- Energy Star
- Life-Cycle costing analysis

Tapping into ever-growing technologies that are changing daily, without publication notice, through built environment networks of green designers.

DESIGN APPROACH

- Set Goals
- Implement Design Phase
- Implement Construction Phase
- Evaluate Results

COST IMPLICATIONS

None - to utilize the guidelines to keep the goals intact, but not apply for 3rd party certification of the completed building.

RESOURCES

Carbon Neutral Buildings - The Aldo Leopold Legacy Center www.aldoleopold.org/legacycenter

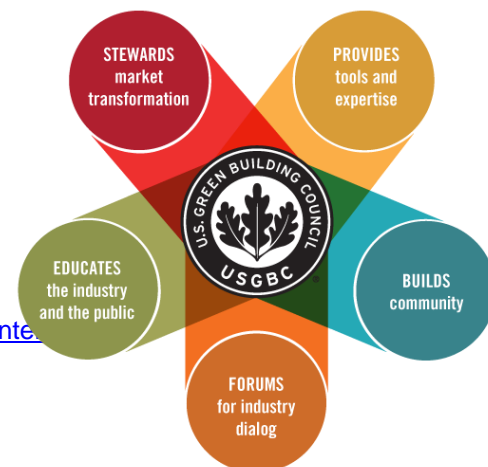
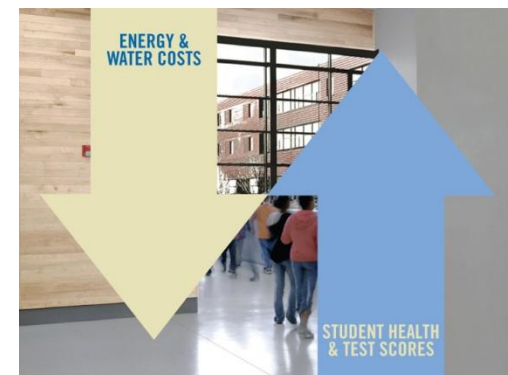
LEED – Leadership in Energy and Environmental Design www.usgbc.com

The Living Building Challenge – in pursuit of true sustainability in the Built Environment

International Living Building Institute www.ilbi.org

2030 e2 Estimating Tool: www.2030e2.perkinswill.com

Allows users to set target goals for four key areas: energy efficiency, on-site renewable energy, grid-supplied renewable energy, green power offset [RECs]



GOAL 3: Regional Identity + Ecology – appropriate to place

INTENT

- (a) To develop a facility true to Central Kentucky's sense of place and avoid development practices that will result in "Anywhere, USA".
- (b) Students and visitors should develop an appreciation for maintaining the appropriateness of the identity and ecology of Central Kentucky.

BENEFITS

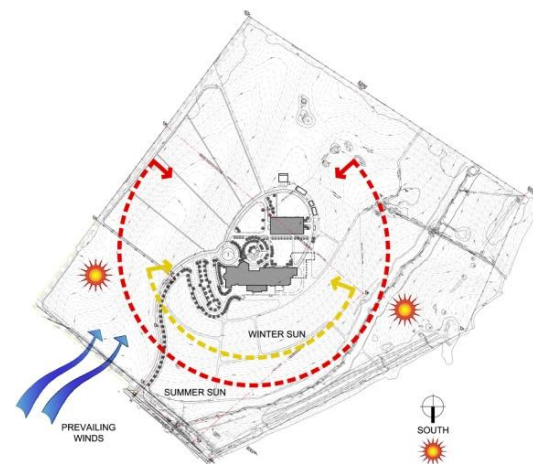
- Educational
 1. Develops an appreciation for what makes Central Kentucky unique relative to the rest of the world.
 2. Develops the ability to identify indigenous flora and fauna versus invasive non-natives and understand the advantages of native species.
 3. Provides a demonstration of the diversity of the organisms and their varied ecosystems, from the upland grasslands to the wooded streams of Central Kentucky.
- Economic
 1. While Central Kentucky has a reputation for its agricultural economic base, (especially the equine industry) the adoption of sustainable agricultural practices to protect the resources that make it unique is critical to its future success. This is also a major component of tourism.
 2. Ecologically sound practices promote a healthy ecosystem necessary for productive agriculture, e.g. Bees necessary for pollination.
 3. Cost savings enjoyed for native plants that use less water and fertilizer rather than using herbicide to fight invasive species.
 4. A dollar earned in Kentucky is spent in Kentucky.

DESIGN STRATEGIES / APPROACH

1. Keep development to a tight area of disturbance that preserves rural viewsheds from road and adjacent lands.
2. Preserve natural site features – natural rolling slopes, sensitive stream corridor, soil structures, karst geologic features.
3. Preserve indigenous flora and fauna – protect native vegetation/trees in corridors that maintain key wildlife linkages.
4. Plant native trees/vegetation that is already adapted to the climate, thereby using less water, fertilizer and pesticides.
5. Remove invasive plants to eliminate competition for crops/indigenous species and reduce future costs of herbicide or mechanical means of removal.
6. Use native resources (rock and timber) to preserve the sense of place and reduce costs of transporting materials from off-site.

COST IMPLICATIONS

None, except for the removal of invasive species. A plant survey would need to be performed to determine the scope/cost of this endeavor.



GOAL 4: Site Capacity and Use – sitting lightly on a Greenfield

INTENT

To develop a facility with minimal impact on the environment and its ability to support healthy agricultural practice.

BENEFITS

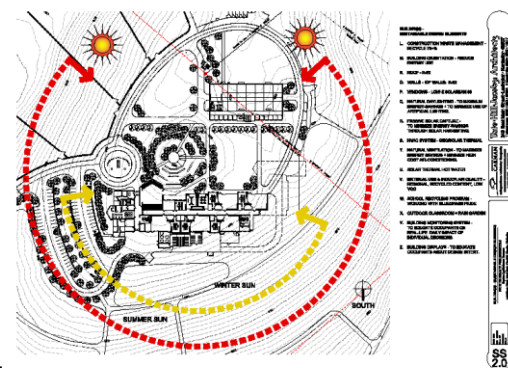
- Education
 1. Provides a demonstration of how clustering buildings/infrastructure leaves more contiguous land for pastures, paddocks, crop fields and buffers from roads/neighbors.
 2. Teaches the benefits of preserving land and water resources by minimizing disturbance to natural systems. Disturbing soil releases green house gases, including carbon dioxide, methane, and nitrous oxide.
 3. Teaches the importance of maintaining the integrity of the land by preserving soil structure and fertility.
 4. Teaches the benefits of recycling land clearing materials during construction and agricultural practice.
 5. Provides a demonstration for alternatives to typical impervious development.
- Economic
 1. Reduces legal costs associated with liability claims by neighbors or regulating agencies.
 2. Reduces land stabilization costs during construction when area of disturbance is minimized.
 3. Reduces costs for hauling waste off-site when recycled on-site.
 4. Reduces irrigation/animal watering costs by harvesting or promoting infiltration of rainwater.
 5. On-site produced fertilizer.

DESIGN STRATEGIES / APPROACH

1. Minimize earth moving/grading and soil compaction.
2. Identify adequate acreage of pasture and crop fields to allow field rotation or fallow seasons. Keep 50% of pasture/paddock areas unused for recovery periods.
3. Require contractors to chip/shred cleared vegetation on-site and use as soil amendments to increase organic content and promote ability of soil to infiltrate and store moisture.
4. Utilize pervious pavements (such as pervious concrete/asphalt/pavers, grass pavers or gravel) to promote infiltration, recharge groundwater and minimize flooding.
5. Reduce Heat Island Effect [Roof and Non-Roof]
6. Composting animal waste

COST IMPLICATIONS

1. Significant savings for less earth moving/erosion control/stabilization.
2. Minimal or no savings for recycling rather than hauling off cleared vegetation/trees. Shredding/mixing with topsoil may offset hauling costs.
3. Pervious paving materials can have an initial cost 2 to 3.5 times that of conventional asphalt paving, which means that conventional asphalt is more economical in a life cycle analysis. However, the use of pervious pavements may result in reduced storm piping and curb/gutter costs, depending on site specific conditions, that could offset the cost savings of conventional asphalt.



GOAL 5: Energy - Net Zero Energy Use

INTENT

- Maximize renewable energy through solar harvesting with photovoltaic.
"Net Zero energy use means the electric power consumed on the site will be offset by active solar panels. The building will consume and generate energy during peak times and will rely on the grid power during off peak building times for minimal energy, so that the net electrical power usage on the site will be Zero. Minimizing energy usage is the first step in achieving this goal. This is achieved by energy efficient design along with an occupant philosophy of minimizing building operation costs."

BENEFITS

- The Educational Benefit is to demonstrate to our students that we can live in facilities that do not consume more electricity than they produce. Provide multiple energy systems for student study and observation.
- The Environmental Benefits are not to use any net power on the site that we cannot produce on site ourselves. This provides an onsite carbon neutral power component.
- The Economic Benefit is to not have an energy bill at the facility.

DESIGN STRATEGIES / APPROACH

The first part of the process is to minimize the power usage with the following strategies:

- Two speed or two stage geothermal heat pumps for heating and cooling the building with distributed pumping to minimize power consumption.
- Computer model the building energy use over a year to be able to show different scenarios and how they affect energy usage.
- Only cooling and heating spaces that are necessary. Not heat nor cool the indoor exhibition ring but naturally ventilate it.
- Natural ventilation in lieu of air conditioning in academic building.
- Computer modeling of day light scenarios to provide ideal day lighting with minimal thermal impact.
- Active day lighting controls to dim artificial light when sunlight will do the job.
- Occupancy lighting controls for all areas to turn off light when people are not in the room.
- Photovoltaic panels on the roof to capture free energy from the sun.
- Solar or Geothermal water heating.
- Solar Thermal Radiant Heat
- Bio-Digester gas - energy conversion via micro-turbines.
- The second critical part of the process is to make students and staff aware that efficient operation of the Learning Center is crucial no matter what energy saving designs are used.

COST IMPLICATIONS

Minimizing energy consumption is a standard design philosophy that would be used on most educational facilities with minimal cost implications. Once the systems are minimized, the added Active Solar Grid to offset the electric usage of the facility is a substantial investment in the future.



GOAL 6: Water - Net Zero Water Use + Sustainable Water Discharge

INTENT

- To illustrate our human impact on local, regional and global watersheds.
- To treat all of its own water on-site.
- To use all water produced on the site without sending any to a waste water treatment facility. To derive water on-site for the animal and human usage.
- 100 % of occupants' water use to come from captured precipitation or reused water that is appropriately purified without the use of chemicals.
- 100% of storm water and building water discharge to be handled on-site.

BENEFITS

- Education
 - To fully understand the use of water in daily living.
 - Use of farm well water and filtration technologies.
 - Provides a demonstration of how water can be collected, used and released back to nature using natural processes and without chemicals that adversely affect the environment.
 - Teaches that water does not have to come from public utility that uses energy resources and chemicals to treat water and extend/maintain its infrastructure.
 - Teaches the importance of protecting or restoring the health of receiving water bodies by reducing storm water runoff and the pollutants that it carries.
- Economic
 - Not wasting energy transporting fresh or waste water off the site.
 - Eliminates costs of extending water mains to the property where they do not already exist.
 - Eliminates the cost of purchasing water from the utility or paying sewer fees to the government for its treatment.
 - Reduce costs of engineered approaches to collect, treat and regulate the release of storm water runoff.
 - Natural fertilization opportunities.

DESIGN STRATEGIES / APPROACH

- Capture and recycle storm/rainwater for other uses on site and building plumbing systems.
- Building Systems to include
 - Low water flow plumbing fixtures
 - Waterless urinals.
- Treat water using
 - Constructed Wetlands systems
 - Traditional septic tank and leach field system.
- Reduce impervious surfaces by the use of green roof and impervious pavements to reduce the amount of storm water runoff.
- Infiltrate storm water runoff back into the soil using bioswales and rain gardens rather than piping it to a traditional detention basin that slows the water before it is released to the stream.
- Investigate use of well water tapped into on-site.

COST IMPLICATIONS

- Additional initial cost per plumbing fixture for reduced water usage, in turn reducing the water treatment center.

Water Treatment Approaches

- Wetland systems are relatively expensive during installation, but less expensive to maintain than a Living Machine.
- Septic tanks and leach fields are a moderately expensive system to install. However, tanks must be pumped every few years and repairs to inadequately maintained systems can be expensive.

Storm Water Run-Off

- Bioswales and rain gardens may be less expensive with initial installation costs than piping and storm structures, however, there are annual costs associated with weeding and maintenance of plantings in order to keep them attractive.
- Pervious paving materials can have an initial cost 2 to 3.5 times that of conventional asphalt paving, which means that conventional asphalt is more economical in a life cycle analysis. However, the use of pervious pavements can result in reduced storm piping and curb/gutter costs, depending on site specific conditions, that could offset the cost savings of conventional asphalt.



GOAL 7: Carbon Reduction - Carbon Neutral Bldgs + Fuel Selection

INTENT

To minimize carbon emissions impact by reducing the amount of fuel source needed for building operations.

To use Biofuels [Kentucky produced] which have minimal to no carbon emissions in their use. Biodiesel would be most appropriate for the emergency generator.

Designed to be carbon neutral, in that no fossil carbon is added to the atmosphere as a result of occupancy.

BENEFITS

- Introducing students to the beneficial use of renewable fuels produced in Kentucky.
- Not adding to the Planet's greenhouse gas.
- Supporting regional renewable fuels

DESIGN STRATEGIES / APPROACH

1. Reducing operational energy consumption reduces carbon emissions.
2. Use of Photovoltaics for solar collection.
3. Minimize refrigerant in the HVAC system.
4. Consider no air conditioning except in specific areas, such as Admin and Media Center.

COST IMPLICATIONS

Depending on the local pricing for biodiesel, there may be no added cost.
PV array costs are a substantial investment and are outlined in the Cost Estimate



GOAL 8: Material Use and Indoor Environmental Quality

INTENT

- Provide clean air inside the breathing zone for the occupants, providing a positive effect on the health and well-being of the students and staff as well as the quality and effectiveness of the learning environment.
- Reduce the environmental impact of materials used in the project, and the toxicity of the building environment. Where possible and known, to eliminate material specifications that include persistent bio-accumulative toxins [PBTs], carcinogens and reproductive toxicants.
- Use regional materials that reduce transportation costs and carbon impact.

BENEFITS

- Provide controlled maximum carbon dioxide levels provides a healthier living environment.
- By controlling CO2 levels we provide reduced energy consumption.
- Integrate resource life cycle, waste reduction and recycling topics into the curriculum.

DESIGN STRATEGIES / APPROACH

1. Provide carbon dioxide monitors in the return air.
2. Use MERV 13 filters to better filter the air than standard "butterfly net" filters.
3. Low-Emitting Materials – to reduce indoor air contaminants that are odorous, irritating and harmful to the comfort and well-being of installers and occupants.
4. Daylight and Views – to provide controlled natural daylight into occupied areas to offset use of artificial lighting and to enhance connection between indoor and outdoors spaces.
5. Enhanced acoustical performance – to facilitate better teacher-to-student and student-to-student communications.

COST IMPLICATIONS

Using better filters is a nominal cost that actually reduces maintenance cost due to cleaner equipment. Controlling CO2 levels reduces the amount of outside air required.

Many product manufacturers have responded to the marketplace interest in no VOC materials, thus the cost impact should be minor or none.



GOAL 9: Net Zero Waste – Construction + Composting

INTENT

- To divert construction waste from disposal in landfills.
- Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites
- Minimize excavation requirements and site disturbance
- Create Constructed Wetlands on-site to manage all human waste generated on-site.
- Identify appropriate areas for composting – animal and plant waste.

BENEFITS

○ Education

To get students thinking about consumption, the diminishing of our non-renewable natural resources and the possibility of cradle-to-cradle use of materials. This reality will be part of their adult world.

○ Economic

To save the Owner the contractor passed-on cost of landfill fees and associated transportation.

DESIGN STRATEGIES / APPROACH

Develop and implement a construction waste management plane that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or co-mingled.

COST IMPLICATIONS

Given the site flexibility, LFUCG recycling programs and changes in the recycling marketplace, there should be no negative impact on recycling / construction waste reduction requirements to the general contractor. It should be a cost neutral requirement.

PROJECT SUSTAINABILITY GOALS

- 1. Education + Inspiration
Site and Building as Teaching Tools**
- 2. Using National Guidelines & Benchmarks.**
- 3. Regional Identity + Ecology – appropriate to place.**
- 4. Site Capacity and Use – sitting lightly on a greenfield.**
- 5. Energy - Net Zero: Renewable Energy Use**
- 6. Water – Net Zero: Rainwater Capture / Reuse + Well Water**
- 7. Waste - Net Zero: Constructed Wetlands + Composting**



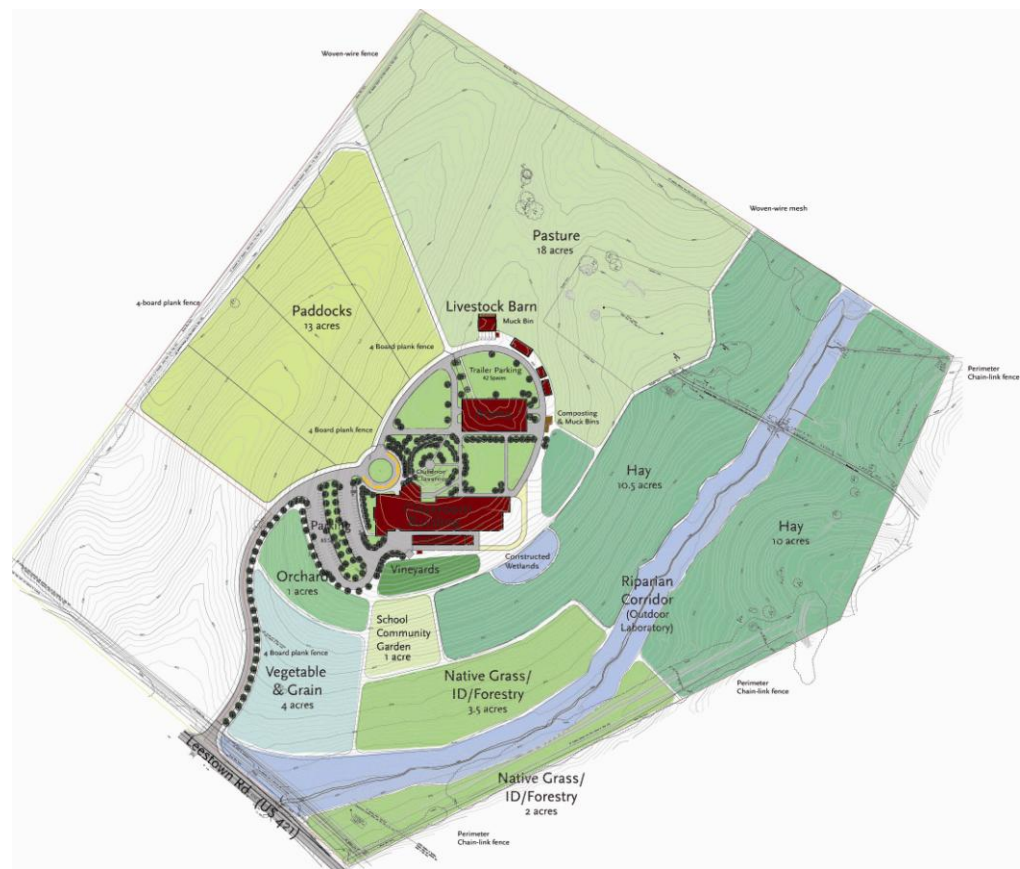
PROJECT “NET ZERO” GOALS

- **ENERGY:**
 - On-site renewable energy
- **WATER:**
 - Rainwater Capture / Reuse
 - Well Water
- **WASTE**
 - Constructed Wetlands + Composting



SITE CAPACITY: Land

- Agricultural Context
- Building Density
- Minimize Disturbance
- Viewsheds & Buffers
- Animal Populations
- Stream Corridor Protection
- Karst Topography



NATURAL RESOURCES: **Water**

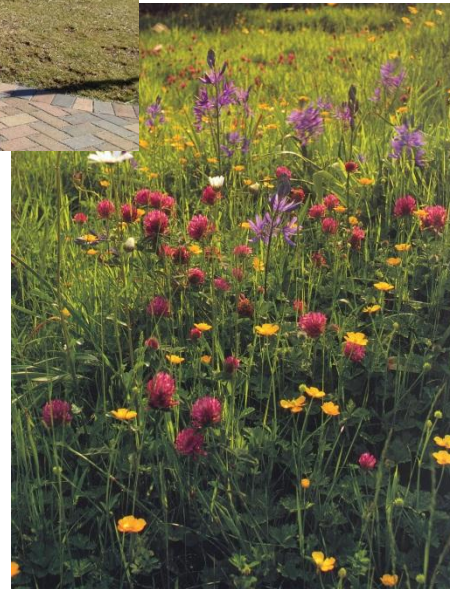


- Rainwater Harvesting from Building Roofs to irrigate crops and water livestock
- Groundwater Well makeup in times of drought
- Future Use in Buildings

NATURAL RESOURCES: **Stormwater**



- Permeable Pavers
- Rain Gardens
- Composting & Recycling



NATURAL RESOURCES: **Sanitary Waste**



- **Constructed Wetland for On-site Sanitary Sewage Treatment**
- **Traditional Septic Tank and Leachfield System for Comparison**



BUILDING ORIENTATION

Ancient Ways in the Built Environment



Priene, Turkey.

Roman = 8th Century BC

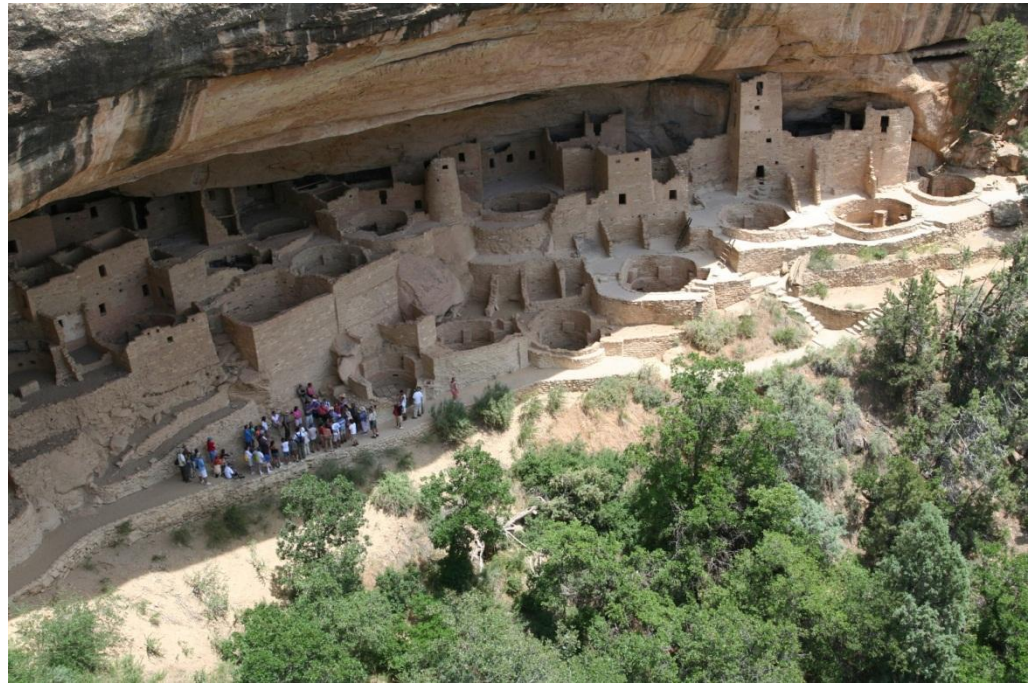
**Mesa Verda in Colorado
near Four Corners area.....**

Anasazi = 550-1300 AD

SOLAR ORIENTATION

Villages + Cities

Ancient solar architecture and urban planning methods were first employed by the [Greeks](#) and [Chinese](#) who oriented their buildings toward the south to provide light and warmth.



BUILDING ORIENTATION

Ancient Ways in the Built Environment

Solar Orientation

Passive Solar

Thermal Mass

Solar Hot Water



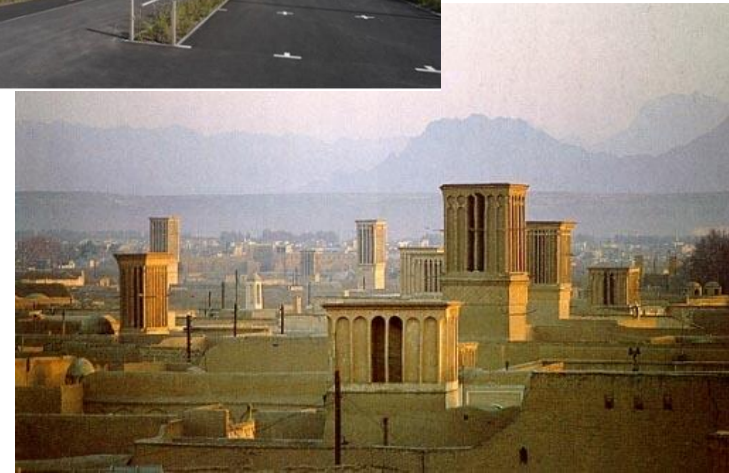
Roman bathhouses had large south facing windows. Solar design was largely abandoned in Europe after the Fall of Rome.....but continued unabated in China where cosmological traditions associate the south with summer, warmth and health.



Natural Ventilation

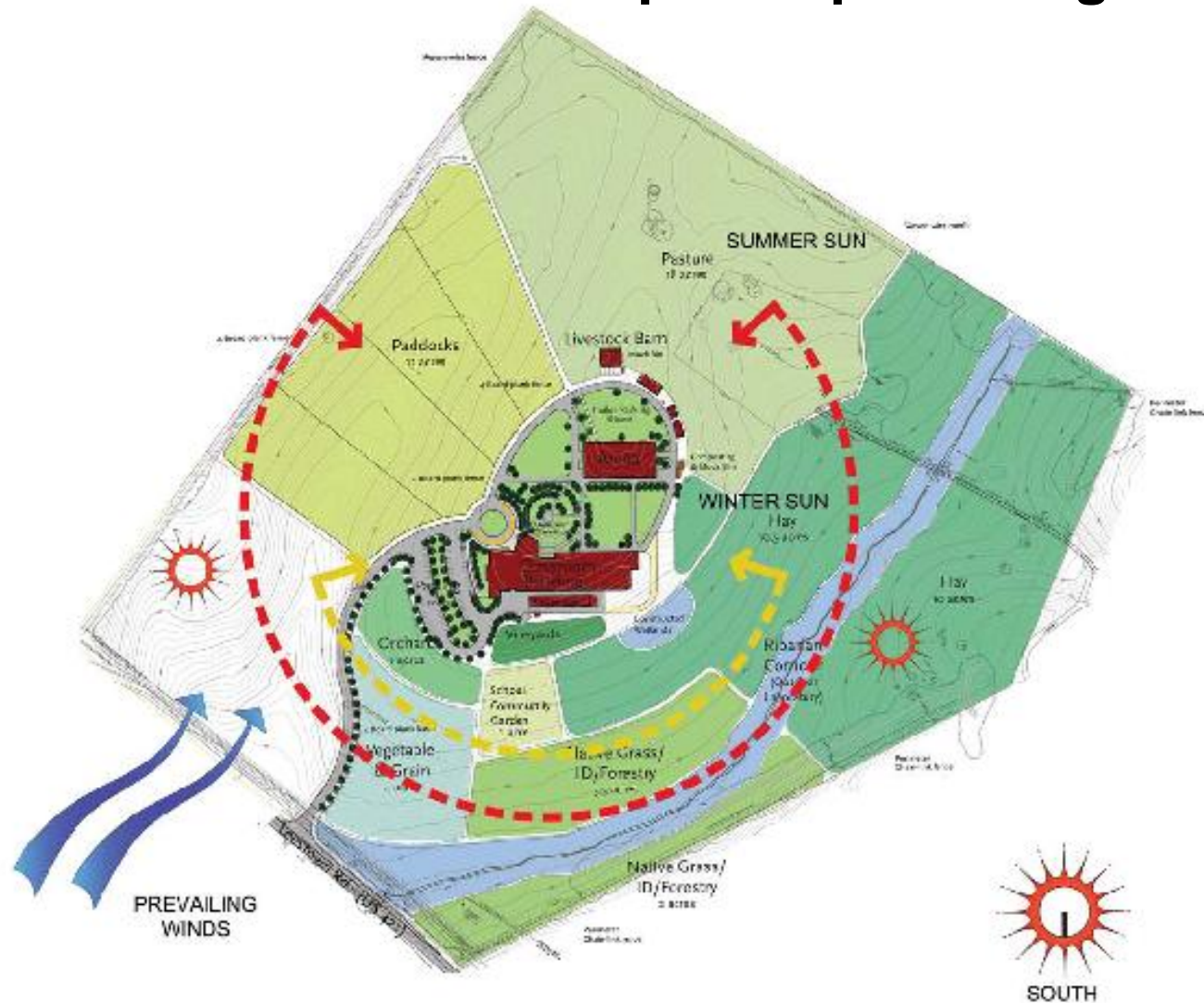
Prevailing winds

- ✓ Wind-driven
- ✓ Pressure-driven
- ✓ Stack ventilation
- *Windcatchers*



BUILDING ORIENTATION

Natural Elements = solar path + prevailing winds



BUILDING ENVELOPE




Strategies

- 🌿 ICF Construction R-23.6c.i. vs. R-19 Code
- 🌿 Roof R-30 vs. R-20
- 🌿 East West Orientation for solar orientation



BUILDING ENVELOPE

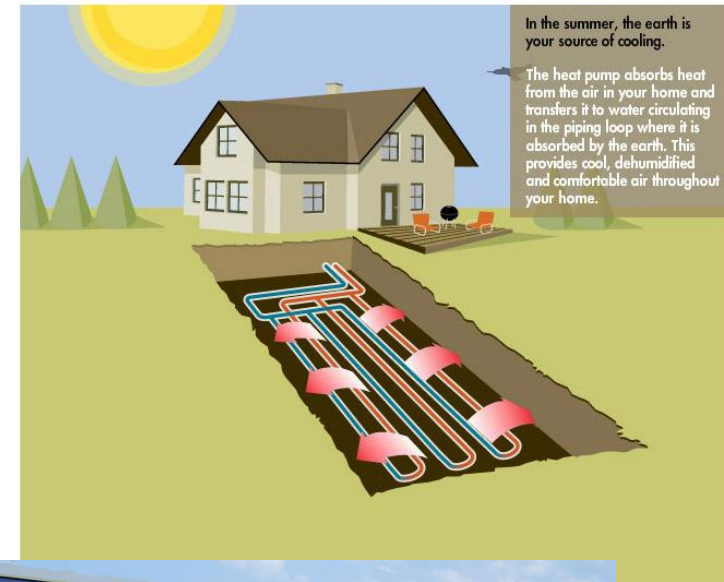
Strategies

-  **Glazing U-Value 0.26 vs 0.33**
-  **East West Orientation to maximize Daylighting**
-  **Roof with southern exposure for solar orientation**



MECHANICAL Strategies

- Geothermal HVAC
- Energy Recovery
- Demand Control Ventilation
- High Volume/Low Velocity Fans
- Fin Tube Radiators



OPERATIONAL Strategies

- Building Climate Zones
- Thermal Breaks in Building
- “Cultural Change”



63° F
light rain
10 mph SSW

Green Features Map

Geothermal HVAC

Just a few feet below the earth's surface the average temperature is surprisingly steady. The Locust Trace Geothermal HVAC systems take advantage of this by pumping water through hundreds of feet of piping in the ground beneath our parking lot. This piping is rejecting or absorbing the heat from the building's HVAC system with the earth.

Tour The Building

Live Data Systems

How To Be Green

SIEMENS

63° F
light rain
10 mph SSW

Virtual Tour

16 GREENHOUSE: AQUACULTURE - Locust Trace students have their very own aquaculture lab. This lab will allow them to study the life cycle of both egg bearing and live bearing fish. They will be working with Koi, Tilapia, Bass, Catfish, Blue Gill and more.

Previous
Next

Tour The Building

Live Data Systems

How To Be Green

SIEMENS

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Rainwater

Live Data
How It Works

Rain that falls on the roof flows down a series of pipes and is collected in a large underground water storage tank. Rain water is then filtered and pumped from the storage tank to the building where it is used for irrigation and flushing toilets.

Cistern Level:

Tour The Building

Live Data Systems

How To Be Green

SIEMENS

63° F
light rain
10 mph SSW

Green-Collar Education

Locust Trace AgriScience Farm is revolutionizing agricultural and sustainability education. Never before have high-school students in central Kentucky been given an opportunity to learn in an environment so rich in efficient design and hands-on content. The best classroom, the best laboratory, and the best field trip is now all in one place. See if you agree with our nickname: "The Greenest School East of the Mississippi!"

Touch the images to learn more.

Sustainable HVAC

Here on the Locust Trace campus we are taking advantage of the sunlight. The building is heated with a 7,400 sqft HVAC solar thermal array. The solar thermal array harnesses the sun's heat and uses it to heat the building. When there is not enough sunlight to heat the building, we use a geothermal HVAC system. The geothermal HVAC system transfers the heat of the refrigeration cycle through miles of piping buried beneath the earth's surface. All of this combines to create a very efficient HVAC system. Look up to check out the colorful duct work inside the building which pipes air through the building.

Close

Tour The Building

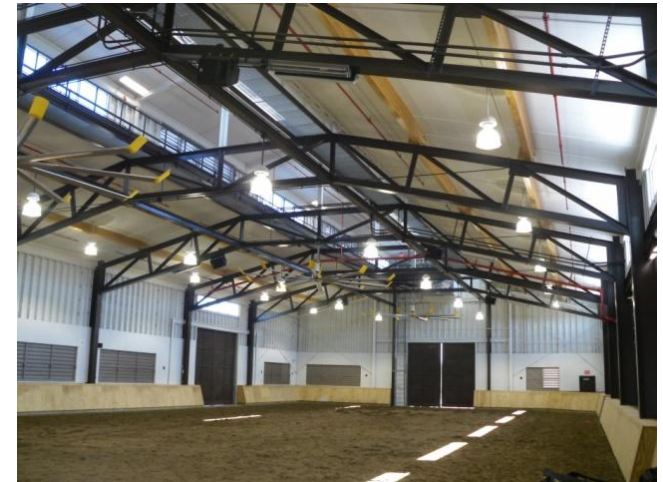
Live Data Systems

How To Be Green

SIEMENS

ELECTRICAL Strategies

- Highly Efficient Lighting design
0.5 W/sq ft. vs 1.3
- LED Site Lighting with
High/Low Control
- Natural daylight harvesting
- Tubular daylighting devices
- Lighting controls
- Occupancy sensors
- Reduce phantom plug loads



DAYLIGHT Strategies

- Architectural
 - Raised exterior walls
 - Solatubes
- User Controls & Interaction
- Control of Artificial Lighting
- Control of Natural Lighting
 - Concerns with IWB Projectors
- Sensor Placement



What is Net Zero Energy?

- Annual Energy Cost
- Carbon Footprint
- Source Consumed vs. Site Produced
- Site Consumed vs. Site Produced
 - *Annual energy use expressed in kBtu/sf yr units*



SOLAR RENEWABLE Energy Strategies

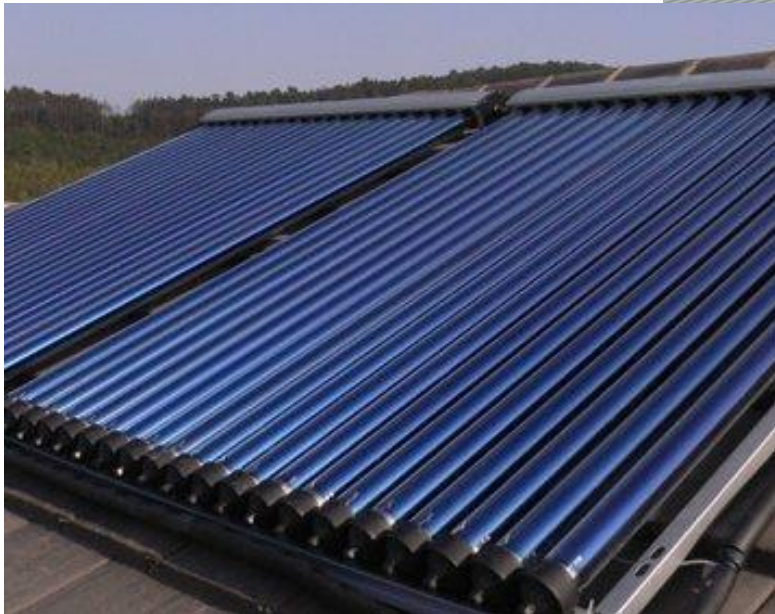
Cost/Performance of PV Energy

- Bid day cost \$1,037,000
- 175 KW Solar PV
 - 574 – Sunpower 305 Panels
- 3 Inverters
 - 100KW SatCon PowerGate Plus
 - 2-50KW SatCon PowerGate Plus
- \$5.71/W Installed



SOLAR RENEWABLE Thermal Strategies

- 7400 Square Feet of Solar Thermal Panels
 - 168 Panels
 - 1 Million BTU's



NET ZERO Goals

- *Energy*
 - Power
 - HVAC
- *Water*
 - Rainwater
 - Well water
- *Waste*
 - Sanitary
 - Composting
 - Organic



STATISTICS

- **Opened August 2011**
- **250 students**
- **High School**
- **½ day classes**
- **5 Major Labs**
 - Plant & Land Science
 - Biotechnology & Environmental Science
 - Agriculture Power Mechanics
 - Equine & Vet Science
 - Small & Large Animal Science
- **3 Core Classrooms**
- **Media Center**
- **Assembly**
- **Arena**



SCHOOL is in session

“The shape of the future is changing rapidly and education must keep pace.”

John Price, Chair – Fayette Co School Board

OWNER's Occupancy - Experiences

Paper recycling
for bedding.

Animal waste

Composting for
fertilizer.....



Observing a
veterinarian
during a dog
check-up
procedure.....



OWNER's Occupancy - Experiences



“Locust Trace is a wonderful opportunity to explore hands-on education. Students thrive when they can put into practice what they are learning about in class.”

“It is a joy to teach students that want to be at school. The students at Locust Trace enjoy being here and are eager to learn.”

**Todd Harp, teacher @
Locust Trace**

- “For my students that come from an ag-production background, it’s exciting to teach them new production practices, and they become a resource for other students, bringing practical experience and examples to our class.
- But it’s exciting for the new kids, to show them where their food comes from and to get them connected to the Earth.”

Carrie Davis, teacher @ Locust Trace



“NET Zero Ready”

- **KRS 157.455 - Legislative Definitions:**
 - Net Zero Building means.....
“a building in which the amount of energy provided by on-site renewable sources is equal to the amount of energy used by the building.”
- **Building is NET Zero Energy “ready”**
 - Drastic Energy Reduction:
 - 70% or greater compared to ASHRAE National Average.
 - Utilizes Sustainable Design Strategies:
 - as reviewed on FCPS Locust Trace AgriScience.
 - NOW Building is NET Zero Energy “ready”:
 - when funding is available for the renewable energy components to be purchased and installed – including photovoltaics, power converters and any other related elements to fully hook-up an on-site renewable energy source (s).

“Sustainability”

Not Trendy New Approach

- *Ancient Ways of Building*
- *Integration of Natural Environment + New Technologies*



Goals & Strategies

work-in-progress:

the greening of our buildings

Continuing the Dialogue



**It's
about kids.**

FAYETTE COUNTY PUBLIC SCHOOLS



architects
TATE HILL JACOBS

POAGE
ENGINEERS
& ASSOCIATES
4 Le.
Ph:
Fax:

